ENTOMOLOGY.[1]

Biology of the Glowworm.—Some interesting observations on the New Zealand Glowworm (*Bolitophila luminosa*) are recorded by A. Norris.[2] The larvæ secrete a mucus, on which they slide, leaving a mucus track like the snail. The mucus is also used to make luminous webs. "When the larva is making a fresh web, it raises its head and the first four or five segments in the air, and reaches round about till strikes something. It then draws its head back a little way, thus making a very fine thread of mucus. It then passes it to the thick mucus on the first segment, then slides out a little way and makes another thread on the other side in the same way, fastening each to the thick mucus on the body. When it has made a sufficient number of these braces, it begins to make the strings of beads which hang downward from these braces by gliding out on the braces and lowering its head and about half the body. It then works its head up and down as if to vomit. You can see the mucus gathering on the body. Then it draws its head right back into the first two segments, as if it were turning inside out. It then catches hold of the mucus on the edge of the segment and forces it forward. Now the head is out straight, with a large drop of mucus all round it, like a drop of water. Then it draws its head gently out of the mucus, thus making a short, fine thread from it. It then makes another drop and another short thread; then a drop and so on until it has made several of these pendents of beads, which vary in length. I have seen them from one inch to four or five inches." In the small caves where the larva lives, these webs reflect the light from the shining glowworm.

Mr. Norris believes the webs are formed to entangle insects and Crustacea, as he has found many of these dead in the webs, and some were hollow as if the body contents had been eaten. "When the insects are alive, the larva may be seen smothering them with mucus." One was also seen actually feeding on the inside of a Crustacean.

Embryonic Development of Tortrix.—As a result of recent studies of *Tortrix ferrugana*, J. W. Tutt says:[3] "It appears certain that

[1] Edited by Clarence M. Weed, New Hampshire College, Durham, N. H.

[2] Ent. Mon. Mag., Sept., 1894.

[3] Ent. Record, V, 215, Sept., 1894.

there are in its embryo four distinct cephalic segments, which, in the early stages of embryonic development are large (compared with the other segments which are developed later), and are made still more distinct by the possession of buds or processes. As development goes on, these four segments get welded together, and become not only proportionately, but absolutely smaller than at first. When the abdominal segments are in course of development, there certainly appear to be eleven of them. The three thoracic segments are, in the early stages of development, large and almost circular, and the next segment (1st abdominal) is of the same character, looking at this time much more like a thoracic than an abdominal segment, though it has, of course, no appendages. The eye spots in this species are remarkably conspicuous as two reddish patches, and become apparent at about the same time that the abdominal segments first show. As development proceeds, the cells of the developing *T. ferrugana* appear to be stained here and there with red patches, especially along the ventral area of the alimentary canal, but differently distributed in different examples. These afterward spread over the whole of the embryo." It was suggested that this color was connected with the skin. The thoracic legs develop when the embryo begins to show segmentation. The embryo is then somewhat curved, "with the head slightly bent round toward the anal extremity, but with the legs outside, *i. e.*, the larva is bent back upon itself so as to form a curve agreeing roughly with the curvature of the shell, with what afterwards becomes the ventral surface of the larva outside and the dorsum towards the centre. The embryo then gradually changes its position, the anal segments curling around and being pushed by the growth of the preceding abdominal segments slowly up the ventral surface of the larva whilst the dorsum gets pushed out, as it were, towards the centre of the egg. During this process the embryo becomes shaped something like the letter S, the movement continuing until a complete reversal of the embryo has been affected."

The Rabbit Bot Fly—Cuterebra cuniculi Clark.—We are greatly indebted to Mr. Percy Selous, of Greenville, Mich., for specimens, notes and drawings of the rabbit bot fly, *Cuterebra cuniculi.* The larva of this species is quite often taken from the rabbit, though few persons are successful in rearing the fly from the larva, and Mr. Selous is to be congratulated on his success.

The notes of Mr. Selous on the rearing of the bot are as follows: 'The ripe larva dropped from a rabbit I shot last September. The

grub was between the fore legs rather high up, and when expelled, the pocket in which it had lived had just the appearance of the interior of the anus in mammals. I took the grub home and let it burrow into a box of earth from which the fly emerged, something like what I have shown in my sketch, on the 22d of May. As a naturalist, I am deeply interested in such matters as this, and the fact that I have been able to follow my bent in South Africa, South America and many other countries does not tend to make me less so."

The grub, as shown by Mr. Selous in the accompanying drawings, is over an inch and a half long and nearly an inch broad. The pupa case is very thick and heavy, with blunt, thick-set tubercles covering the outside of it. The fly has the head, legs, ventral region and all of the abdomen, except the first segment, black. The thorax and the first segment are thickly covered with fine silken yellow hair. The wings are dark and smoky.

This species of grub is quite common in the front quarters of rabbits this time of the year, and no doubt if more hunters and naturalists knew of its presence in the rabbit and how to save and rear the grub, more of the flies might be reared. Mr. Selous has made a start; who will follow?—G. C. Davis. Agr'l College, Mich.

Insects' Vision.—Mr. A. Mallack adds another paper to the voluminous literature of vision in insects.[4] His observations and calculations, as we learn from the "Journal of the Royal Microscopical Society," have led him to conclude that "Insects do not see well; at any rate, as regards their power of defining distant objects, and their behaviour, favors this view. They have, however, an advantage over simple-eyed animals in the fact that there is hardly any practical limit in the nearness of the objects they can examine. With a composite eye, the closer the animal the better the sight, for the greater will be the number of lenses employed to produce the impression. In the simple eye, on the other hand, the focal length of the lens limits the distance at which a distinct view can be obtained. Of the various forms of insects examined, the best eye would give a picture about as good as if executed in rather coarse wool-work, and viewed at a distance of a foot."

Chinch Bug Diseases.—Professor F. H. Snow makes an elaborate report[5] of his recent extended experiments with the fungus Sporo-

[4] Proc. Roy. Soc. Lond., LV, pp. 85–90.

[5] Univ. of Kansas Exp. Station, Third Rept., 1894.

trichum which causes a fatal malady of chinch bugs. More than three thousand experiments are reported, more than half of which were believed to be successful. The great difficulty in the practical use of the fungus was the dry weather, during which no progress could be made.

Greenland Insects.—In reporting on a small collection of Microlepidoptera from McCormick Bay, Professor C. H. Fernald remarks:[6] "One of the most interesting features of this small collection is the very dark color of the insects. The specimens of *Laodama fusca* and also of *Pyrausta torvallis* are much darker than any I have ever seen before, either of those taken in New England or Labrador, but when we recall that Mr. Mengel states that they rest on the lichen-colored rocks, we have not far to seek for the cause of this dark color." These lichens are dark brown or black, and the laws of natural selection would lead to the establishment of a dark race through the elimination of the light-colored individuals. Professor Fernald describes one new species —*Sericoris mengelana.*

Habits of Larval Coleoptera.—F. M. Webster reports[7] that larvæ of *Leptotrachelus dorsalis* Fab. feed on larvæ of *Isosoma tritici* Riley, and pupate in wheat stubble, after plugging up open end. The larva of *Phalacrus politus* Mels. develops in smut of rye and Indian corn. A female *Neoclytus erythrocephalus* was seen ovipositing in trunk of dead apple tree, and *Bruchus mimus* Say was reared from seeds of *Cercis canadensis.* The larva of *Disonycha caroliniana* Fab. feeds on foliage of *Portulaca oleracea,* and *Apion segnipes* Say develops in pods of *Tephrosia virginiana.*

Biology of the Horse Bot.—From observations on the eggs of the common horse bot fly, Professor H. Osborn reaches the following conclusions:[8] "(1) That the eggs do not hatch, except by the assistance of the horse's tongue. (2) That hatching does not ordinarily occur within ten or twelve days, and possibly longer, or, if during this period, only on very continuous and active licking of the horse. (3) That the hatching of the larvæ takes place most readily during the third to fifth week after deposition. (4) That the majority of the larvæ lose their vitality after thirty-five to forty days. (5) That the larvæ may retain their vitality and show great activity upon hatching

[6] Ent. News, V, 132.
[7] Ent. News, V, 140.
[8] U. S. Dept. Ag., Div. Ent., Bull. 32, p. 48.

as late as thirty days after the eggs were deposited. (6) That it is possible, though not normal, for eggs to hatch without moisture or friction. (7) That in view of these results, the scraping off of the eggs or their destruction by means of washes will be very effective, even if not used oftener than once in two weeks during the period of egg deposition, and probably, that a single thorough removal of the eggs after the period of egg deposition has passed, will prevent the great majority of bots from gaining access to the stomach."